RACE for 2030 BUSINESS

Anaerobic digestion for generating power and displacing natural gas/diesel

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ARENA's Purpose

ARENA is the Australian Renewable Energy Agency.

The Agency was established by the Australian Government in July 2012.

Our purpose is to improve the competitiveness of renewable energy technologies and increase the supply of renewable energy through innovation that benefits Australian consumers and businesses.

AUSTRALIAN RENEWABLE ENERGY AGENCY

KEY STATISTICS 2012-2021

ARENA

Australian Government
Australian Renewable Energy Agency

INVESTED	PROJECTS	VALUE	INVESTMENT LEVERAGE
$1.70B	586	$6.92B	$1:$3.06

PROJECTS BY TECHNOLOGY

BIOENERGY	GEOTHERMAL	GRID INTEGRATION	HYBRID	HYDROGEN	OCEAN	SOLAR PV	SOLAR THERMAL	STORAGE - BATTERIES/PHES
$131M	$42M	$270M	$110M	$60M	$44M	$725M	$178M	$143M

RECENT ACTIVITY

$71.9M Future Fuels Fund launched to help businesses and regional communities take advantage of opportunities offered by hydrogen, electric, and bio-fueled vehicles

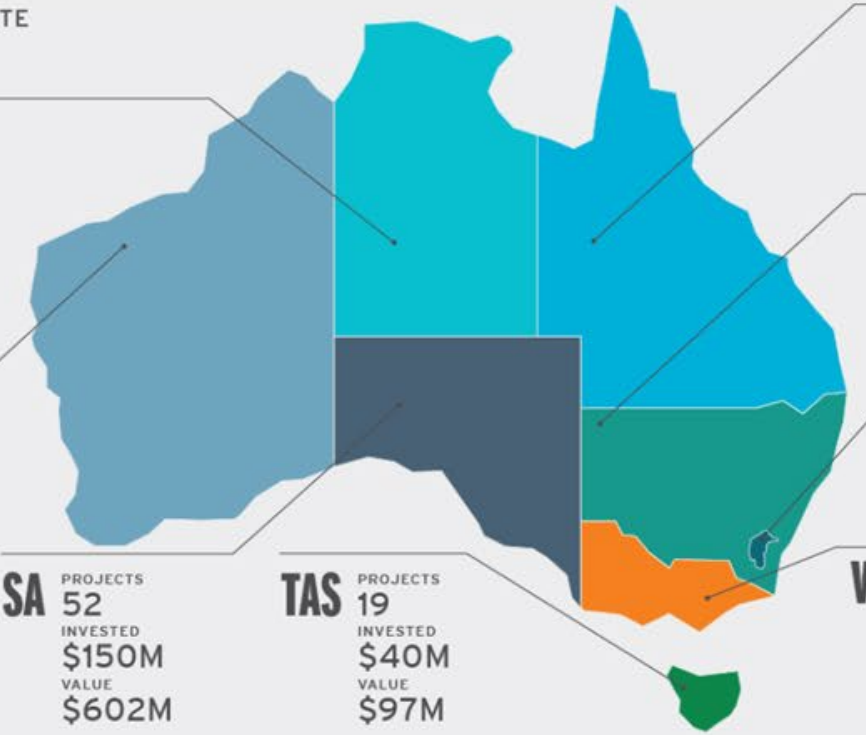
$1.98M to demonstrate aggregated hot water heater load control

$1.6M for a residential electric vehicle charging orchestration trial

$1.49M to commercialise repurposed EV battery and inverter systems

RELEASED State of DER Technology Integration Report, which identifies what is required to integrate DER into Australian electricity markets

INVESTMENT BY STATE



NT PROJECTS 7 INVESTED $39M VALUE $82M

WA PROJECTS 37 INVESTED $186M VALUE $1.83B

SA PROJECTS 52 INVESTED $150M VALUE $602M

TAS PROJECTS 19 INVESTED $40M VALUE $97M

VIC PROJECTS 108 INVESTED $199M VALUE $488M

QLD PROJECTS 57 INVESTED $202M VALUE $1.20B

NSW PROJECTS 238 INVESTED $819M* VALUE $2.44B

ACT PROJECTS 68 INVESTED $67M VALUE $186M

* Includes $567 million contributed to projects inherited by ARENA in 2012.

INVESTMENT LEVERAGE ALONG THE INNOVATION CHAIN

STUDY	R&D
$1:$1.68	$1:$1.63
DEMONSTRATION	**DEPLOYMENT**
$1:$1.83	$1:$5.73

ENGAGEMENT

INDUSTRIAL ENERGY PROGRAM

Consulted more than 80 people on the Industrial Energy Transformation Studies Program, which aims to help large energy users identify ways to lower energy costs and reduce emissions.

DEIP CEO FORUM

Distributed Energy Integration Program (DEIP) CEOs and senior representatives met to discuss DEIP's progress and next priorities.

31 MARCH 2021

Bioenergy Roadmap

Aims to identify the role that the bioenergy sector can play in Australia's energy transition and help further reduce emissions.

Key focus areas:

- opportunities where the bioenergy sector in Australia may have a competitive advantage, which may include:
  - the role of biofuels to help decarbonise the industrial and transport sectors and contribute to Australia's liquid fuel security
  - opportunities to decarbonise the gas network
  - bioenergy opportunities for heat, steam and power
- current economic and regulatory impediments to the development of the bioenergy sector in Australia
- understanding of markets, technologies, resources, social & environmental factors underpinning the current and potential bioenergy sector
- insights into the economic opportunities for Australia, including a focus on regional Australia

Consultation Process Overview and Themes

9 Consultation Workshops

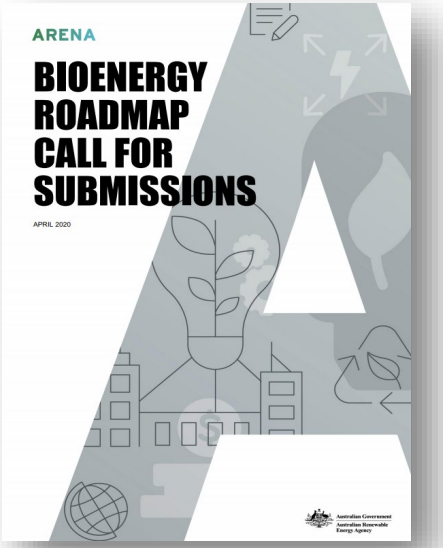
17 Direct Interviews

147 Online Submissions

137 Participants in Public Sessions

Process

- Dedicated landing page launched on ARENA website
  - Accompanied by press releases from the Minister and ARENA
- Landing page included:
  - Expression of interest form for Consultation Workshops
  - Call for Submissions document with accompanying form and upload instructions
- As expected, registrations for workshops exceeded the target number of participants (target was 15-20 per session)
  - As planned, overflow re-directed towards their second choice or Public Session
- The number of submissions has exceeded expectations
  - Over 70% are public submissions



Benefits

- Reduced carbon footprint
- Address disposal problem
- Provide secure and reliable dispatchable electricity
- Support rural economies
- Improved air quality

East Rockingham and Kwinana Waste Incineration of MSW to electricity

East Rockingham Resource Recovery Facility: Municipal, industrial, commercial

Waste to Energy Technologies in Australia today

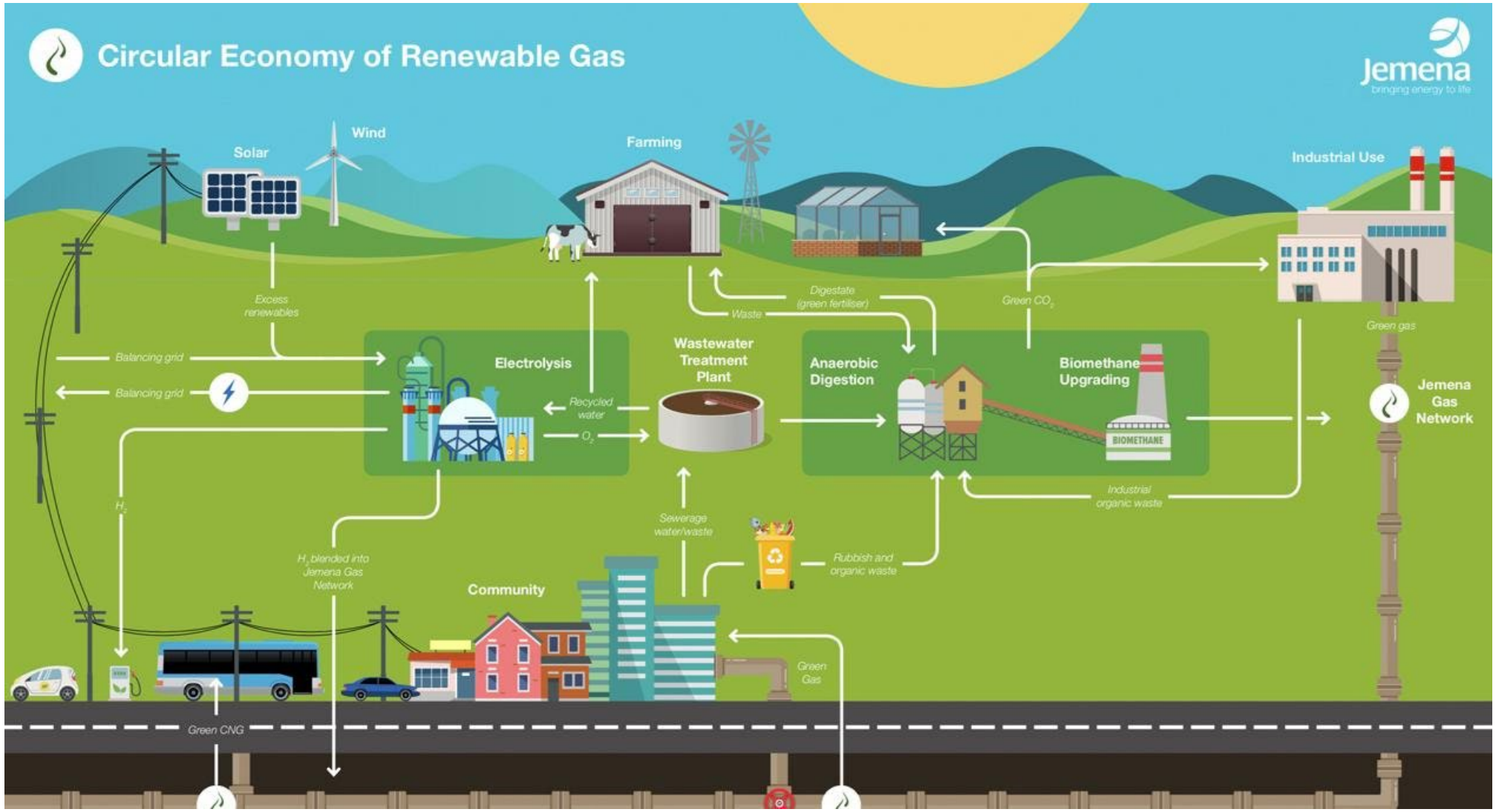
- Incineration
- Anaerobic Digestion
- Gasification

Goulbourn Bioenergy Project: Anaerobic digestion to capture biogas

Logan City Council - Gasification

Renergi - Energy from Waste Through Pyrolysis

Jemena / Sydney Water: Malabar Biomethane Injection Project



ARENA

- ARENA has provided $131 million in funding towards bioenergy projects across Australia.
- For more on our bioenergy portfolio, visit https://arena.gov.au/renewable-energy/bioenergy/
- For funding enquiries please email: proposals@arena.gov.au

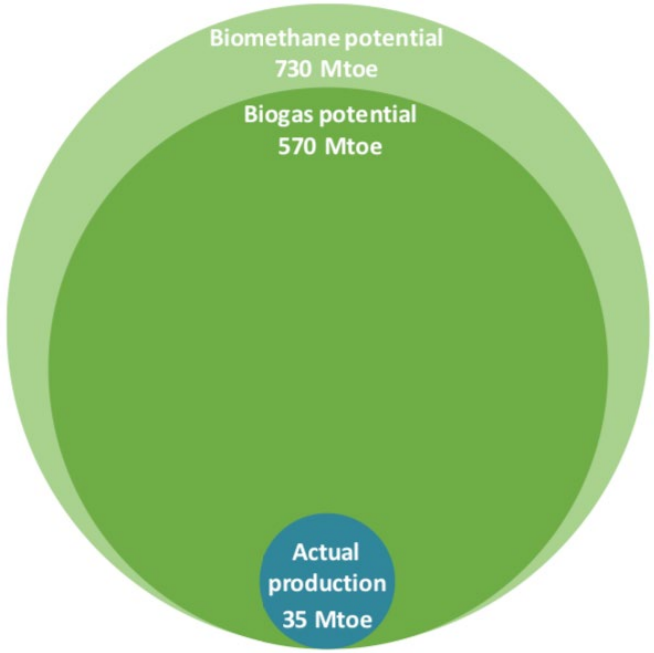
Research theme B5:

Anaerobic digestion for generating power and displacing natural gas/diesel

B5: Anaerobic digestion for generating power and displacing natural gas / diesel

- **Waste streams** are releasing methane, which is a much more potent than CO_2
- **Biogas from waste** (~60% methane and ~40% CO_2) can be used for electricity, process heat, transport fuel or to feed into natural gas pipelines
- Research is needed to realise the potential of **sustainable**, cost-effective and safe biogas
  1. More cost-effective technologies
  2. Maximising the yield of existing technologies

Biogas and biomethane production in 2018 against the sustainable potential today



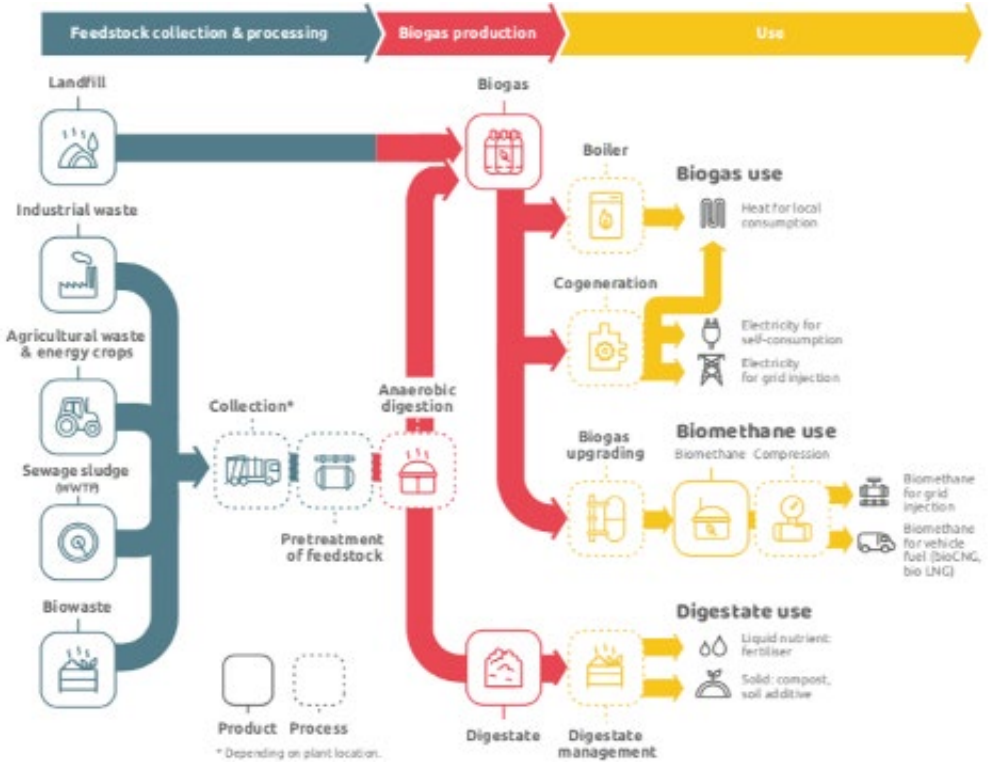
Source: Outlook for biogas and biomethane (IEA, 2020)

B5 Opportunity Assessment
Theme specific scope

Where can applied research unlock the potential of sustainable biogas in Australia to deliver >$125 million in energy savings by 2030?

- Sustainable feedstocks
- Conversion technologies
- Biogas products
- Market development
- Market transformation

Comparisons with other conversion pathways (e.g. gasification) or products (e.g. hydrogen) may be considered



Biogas supply chain pathways (ENEA Consulting, 2019). NB: this does not include CO_2 as a product, which may offer an additional value stream for biogas upgrading pathways.

B5 Opportunity Assessment
Core competencies

Where can applied research unlock the potential of sustainable biogas in Australia to deliver >$125 million in energy savings by 2030?

- Sustainable feedstocks
- Conversion technologies
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- Market development
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Key capabilities

- **Social science** (esp. social licence)
- **Systems and transitions**
- **Sustainable biomass feedstocks**
- **Engineering** (conversion tech)
- **Economics and markets** (electricity, gas and transport)
- **Demonstration experience**
- **Modelling** (impact)

Q&A

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Thank you

RACE for 2030

RELIABLE
AFFORDABLE
CLEAN
ENERGY

Australian Government
Department of Industry, Science, Energy and Resources

Business Cooperative Research Centres Program